infectious mononucleosis with neurologic complications, central nervous system manifestations were the first symptoms. In two of the three, heterophile determination gave the only clue implicating infectious mononucleosis. Infectious mononucleosis should be considered in the differential diagnosis of any case in which unexplained acute bizarre neurologic complaints are among the first symptoms.

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REFERENCES

1. Bergin, J. D.: Fatal encephalopathy in glandular fever, J. Neurol. Neurosurg. Psychiat., 23:69-73, 1960.

2. Bernstein, T., and Wolff, H.: Involvement of the nervous system in infectious mononucleosis, Ann. Int. Med., 33:1120-1136, 1950.

3. Bonynge, T., and Von Hagen, K.: Severe optic neuritis in infectious mononucleosis, J.A.M.A., 148:933-34, 1952.

4. Davidson, I.: Serologic diagnosis of infectious mononucleosis, J.A.M.A., 108:289-295, 1937.

5. Durfey, J. Q., and Allen, J. E.: The Gullian-Barré syndrome as a manifestation of infectious mononucleosis, New Eng. J. Med., 254:279-280, 1956.

6. Epstein, S., and Damshek, W.: Involvement of the central nervous system in a case of glandular fever, New Eng. J. Med., 205:1238-1241, 1931.

7. Evans, J.: Neurological complications of glandular fever. II. Review of the literature, Ulster Med. J., 32:35-43, 1963.

8. Evans, J. H.: Neurologic complications of glandular fever. I. Case report, Ulster Med. J., 32:31-34, 1963.

9. Geliebter, S.: Acute infectious mononucleosis complicated by encephalomyelitis, Lancet, II: 753-54, 1946.

10. Hafström, T.: Neurological complications of infectious mononucleosis, Acta Neurol. Scand., 39:69-81, 1963.

11. Johansen, A.: Serous meningitis and infectious mononucleosis, Acta med. Scandinav., 76:269-272, 1931.

12. Karpinski, F. E.: Neurologic manifestations of infectious mononucleosis in childhood, Pediatrics, 10:265-271, 1952.

13. Montandon, Rauch, S., and Reytan: Mononucleosis, Gullian-Barré syndrome and paralysis of the posterior crico-arytenoid muscle, Acta Oto-Laryng., 46:35-42, 1956.

14. Nelson, W. E.: Textbook of Pediatrics, 8th Edition, W. B. Sanders Co., Philadelphia, Pennsylvania, 1964.

15. Nichols, W. W., and Athreya, B.: Encephalitis probably due to infectious mononucleosis, A.M.A.J. Dis. Child., 103:72-76, 1962.

16. Pew, W. L.: Neurologic manifestations of infectious mononucleosis, Northw. Med., 56:695-698, 1956.

17. Raftery, M. B., Schumacher, E. E., Jr., Grain, G. O., and Quinn, E. L.: Infectious mononucleosis and Gullian-Barré Syndrome, Arch. Int. Med., 93:246-253, 1954.

18. Shechter, F. R., Lipsius, E. I., and Rasansky, H. N.: Retrobulbar neuritis, A.M.A.J. Dis. Child., 89:58-61, 1955.

19. Sharfatz, G., and Galpira, A.: Meningoencephalitis in infectious mononucleosis—Report of a case treated with ACTH, Maryland Med. J., 8:185-188, 1959.

20. Silver, H. K., Robertson, W. O., Wray, J. O., and Gruskay, F. L.: Involvement of central nervous system in infectious mononucleosis in childhood, A.M.A.J. Dis. Child., 91:490-493, 1956.

21. Toomey, J. A.: Acute lymphocytic meningitis? J. Pediat., 8:148-153, 1936.

22. Walsh, F. C., Poster, C. M., and Carter, S.: Infectious mononucleosis encephalitis, Pediatrics, 13:536-543, 1954.

Myasthenia Gravis with Thymic Tumor

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SURGICAL REMOVAL of the normal thymus in the treatment of myasthenia gravis is a well recognized procedure. When a true thymic tumor is present, removal of the gland for the treatment of myasthenia is conjectural.

The usual indication for thymic removal in myasthenia gravis is the locally invasive tendency of the tumor and the hope of alleviation of the symptoms in a patient with myasthenia that is refractory to treatment.

The present report concerns an adolescent boy who when first seen had x-ray evidence of a large mediastinal mass, and then rapid onset of myasthenia gravis. The case had interesting facets: the youth of the patient, the rapid onset of symptoms and a return to control through drug therapy after removal of the tumor.

Report of a Case

A 17-year-old Mexican boy was admitted to the hospital on 16 July 1964 with the chief complaints of extreme fatigability, muscular weakness, weight loss of 20 pounds and shortness of breath of two months' duration. He had been entirely well until the onset of the symptoms. There was no history of fever, night sweats, diarrhea, nervousness or intolerance to heat.

On physical examination the patient, who was lying in bed, was asthenic and apathetic. Generalized muscle wasting was apparent. The temperature was 36.9°C (98.4°F), the pulse rate 84 and regular, blood pressure 110 mm of mercury systolic and 70 mm diastolic. No evidence of lymphadenopathy was present and no abnormali-

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ties were noted visually or on palpation and auscultation of the neck, chest and abdomen.

The pertinent physical findings were limited entirely to the neuromuscular system. Both eyelids drooped. Total muscular ophthalmoplegia was noted, with eye movement being decidedly limited in all planes of motion. The eye movements became progressively weaker with activity and the patient was totally unable to lift his eyelids above the horizontal plane. The pupils reacted to light and no nystagmus was noted. There was generalized muscle weakness which became progressively worse on exercise, but no evidence of fasciculation or localized muscle wasting. The deep tendon reflexes were equal and no abnormal reflexes were elicited. Sensibility was not disturbed and the patient's appreciation of touch, pinprick, heat, cold, posture, passive movement and vibration was intact. An intravenous injection of 10 mg of edrophonium (Tensilon®) was given, slowly, and a dramatic improvement of muscle strength followed. Most pronounced were the return of full range of eye motion and the complete regression of ptosis.

Laboratory Data: The urine gave a negative reaction for albumin, glucose and bile. The sediment showed no casts and only one white blood cell per high-power field. The hematocrit was 51 per cent. Leukocytes numbered 8,000 per cu mm, with 65 per cent neutrophiles, 2 per cent band forms, 4 per cent eosinophiles, 28 per cent lymphocytes and 1 per cent monocytes. Serum electrolytes were: sodium 143, chlorides 105, potassium 4.4, and bicarbonate 32 mEq per liter. Results of blood chemical studies: serum calcium 10.6 mg and serum phosphorus 3.9 mg per 100 ml, protein-bound iodine was 4.8 micrograms per 100 ml, and tri-iodothyronine resin uptake 30.5 per cent. Serologic tests for syphilis were negative.

The spinal fluid was clear and colorless, and under normal pressure. Spinal fluid sugar and protein were within normal limits, as was a simultaneous determination of blood sugar. No leukocytes were seen in the fluid.

An electrocardiogram showed a normal sinus rhythm with right axis deviation.

X-ray films taken on admission (Figure 1) showed an increased density overlying the right heart border, interpreted as being consistent with thymoma.

An intravenous angiogram with 50 ml of 75 per cent Hypopaque® showed compression of the right heart border by a smooth extrinsic mass (Figure 2). The heart was otherwise normal in size.

Administration of pyridostigmine bromide (Mestinon®) 60 mg every four hours, was begun, with only slight and transient improvement. Despite an increase in dosage to levels approaching 1 gm daily, the patient's symptoms of fatigability and weakness were not controlled and further measures were indicated.

On 29 July, thoracotomy was performed and a thymic tumor measuring 9.5×9.5×3.5 cm, was removed (Figure 3). The tumor was lobulated and attached to the upper anterior mediastinum by a stalk measuring 4×3×2 cm. Microscopic sections of the tumor showed large sheets of tightly-packed

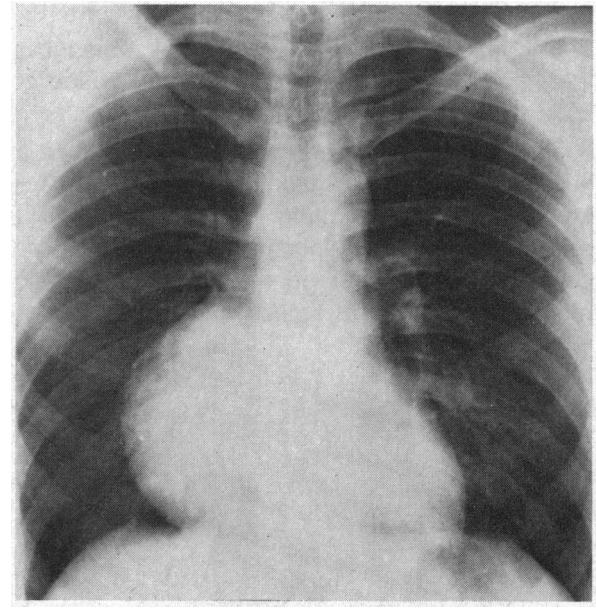

Figure 1.—X-ray film of chest showing increased density overlying the right heart border.

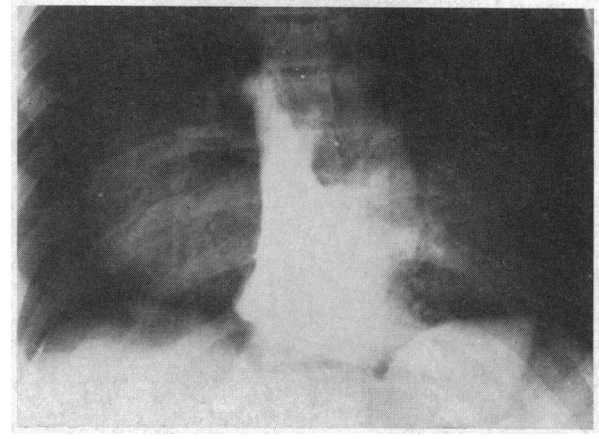

Figure 2.—Compression of the right heart border is shown in this intravenous angiogram.

small cells with normal nuclei and scanty cytoplasm and poorly defined cell borders. These cells were separated by broad septa of dense fibrous connective tissue. Large portions of the tumor showed homogeneous simple necrosis and, in some of the necrotic areas, cholesterol crystal slits surrounded by multi-nucleated giant cells were seen. This appearance is characteristic of a benign thymoma of the lymphocytic type.

Upon completion of thoracotomy, tracheostomy was performed for better tracheal toilet, and respiration was maintained with the aid of a Morsch fixed cycle respirator for several days and, subsequently, with a Bird respirator.

The postoperative course was complicated by a superficial incisional abscess for which appropriate measures were undertaken with good results.

The patient was discharged on 4 September 1964, well controlled on 720 mg of pyridostigmine daily.

Kept under close observation for more than a year now since the operation, the patient was readmitted to hospital three times in the first six months, for left lower lobe pneumonia on two occasions and bronchitis on the third. In the nine months preceding this report, the patient had remained well controlled on oral administration of pyridostigmine, 120 mg at 8 a.m., noon and 4 p.m., plus long-acting pyridostigmine, 360 mg at 8 p.m.

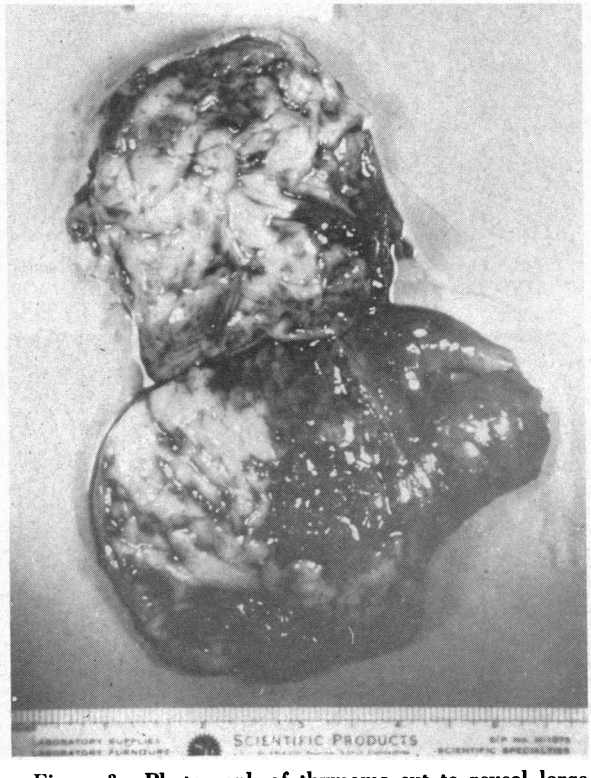

Figure 3.—Photograph of thymoma cut to reveal large lobulations and areas of necrotic tissue.

In the present case use of pyridostigmine bromide following operation to remove a thymic tumor kept symptoms well controlled. In most cases of myasthenia gravis the failure in neuromuscular transfer is due to a lack of "acetylcholine effect," resulting in insufficient depolarization of the motor endplate. Several drugs, called anticholinesterases, can be used to decrease the destruction of acetylcholine, among them edrophonium chloride, neostigmine bromide and pyridostigmine bromide. For regular maintenance, pyridostigmine bromide is preferable because of ease of administration and extended action.

Discussion

Thymectomy is usually performed in patients with myasthenia gravis under 40 years of age. The incidence of clinically detectable thymoma in myasthenia gravis has been variously reported as 12 to 15 per cent and has been most generally noted in the third to fifth decades.[1,2,6,7] Simpson,[6] in a series of 294 patients who had thymectomy, found 36 cases of thymoma, 13 occurring in males. The mean average age of those with thymoma was 39.3 years, and none was less than 24 years of age. Keynes[4] also remarked on the low incidence (4 per cent) of thymoma and myasthenia gravis in persons under 30 years of age.

Viets and Schwab[7] noted that the prognosis of myasthenia gravis with thymoma is especially poor in males irrespective of the therapy. Local invasion of thymic tissue is a danger because of the location of the tumor in the mediastinum in approximation with the great vessels and the heart. Ellis[2] said that about 25 per cent of thymomas are locally invasive or locally implant on pleural surfaces, while Kreel suggested that the malignant potential (based on gross appearance and fixation to surrounding tissue) of thymoma is far higher—up to 80 per cent.

In most clinics, decisions for thymectomy are made with extreme selectivity. However, it is generally accepted that a thymoma should be removed because of the local invasiveness of the tumor.[3,7]

In a review of the literature few reports were found of thymomectomy in myasthenic patients under 20 years of age, and in all cases the patient was a female.

Summary

A case of myasthenia gravis associated with a large thymoma has been presented. The patient was a 17-year-old boy. Thymomectomy was carried out and the patient did well thereafter while receiving pyridostigmine by mouth.

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Generic and Trade Names of Drugs.
Edrophonium—*Tensilon.*
Pyridostigmine—*Mestinon.*

REFERENCES

1. Eaton, L. M., and Clagett, O. T.: Present status of thymectomy in treatment of myasthenia gravis, Am. J. Med., 19:703, November 1955.

2. Ellis, K., and Gregg, H. G.: Thymomas-Roentgen considerations, Am. J. Roentgenology, 91:105, January 1964.

3. Grob, D.: Myasthenia gravis. Current status of management, clinical manifestations and management. J Chr. Dis., 8:536, October 1958.

4. Keynes, G.: Investigations into thymic disease and tumor formation (Cecil Joll Lecture), Brit. J. Surg., 42: 449, March 1955.

5. Kreel, I., Genkins, G., Osserman, K. E., Jacobsen, E., and Baronofsky, I.: Studies in myasthenia gravis, A.M.A. Arch. Surg., 18:251, August 1960.

6. Simpson, J. A.: An evaluation of thymectomy in myasthenia gravis, Brain. 81:112, March 1958.

7. Viets, H. R. and Schwab, R. S., Editors: Thymectomy for Myasthenia Gravis: Record of Experience at Mass. General Hospital, Charles C Thomas, Springfield, Ill., 1960.

Leiomyoma of the Duodenum As an Unsuspected Source of Bleeding

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A 21-YEAR-OLD white male laborer was admitted to the hospital on 10 July 1957 because of tarry stools of one day's duration, accompanied by dizziness, weakness and increased thirst. There had been no pain. He had been in hospital twice before within the year preceding, from 17 August to 31 August 1956, and from 2 April to 16 April 1957, both times for duodenal ulcer with hemorrhage. During the first period in hospital he had received nine units of whole blood. He said that he had a medical discharge from the Navy because of duodenal ulcer.

The patient was thin, weighing 132 pounds. The pulse rate was 95 and blood pressure 110/70 mm of mercury. The conjunctivae were pale. There were scattered *cafe au lait* spots over the whole body. No abnormalities were noted on percussion and auscultation of the heart and lungs and palpation of the abdomen.

Hemoglobin content of the blood was 10.1 gm per 100 ml, the hematocrit 35 per cent and leukocytes 8,250 per cu mm with a normal differential of cells. A serologic test for syphilis was negative and results of urinalysis were within normal limits.

After several days of medical management with restricted diet, antispasmodics and antacids, the bleeding subsided. On 12 July, x-ray examination of the upper gastrointestinal tract showed "marked obstruction to the gastric outlet and a rounded indentation on the superior side of the juncture of the second and third portions of the duodenum" (Figure 1). A second area of indentation was also noted in the third portion of the duodenum distal to the first. No abnormalities were noted on barium enema study.

On gastroscopic examination a slight convexity of the greater curvature portion of the antrum was noted, suggesting external pressure.

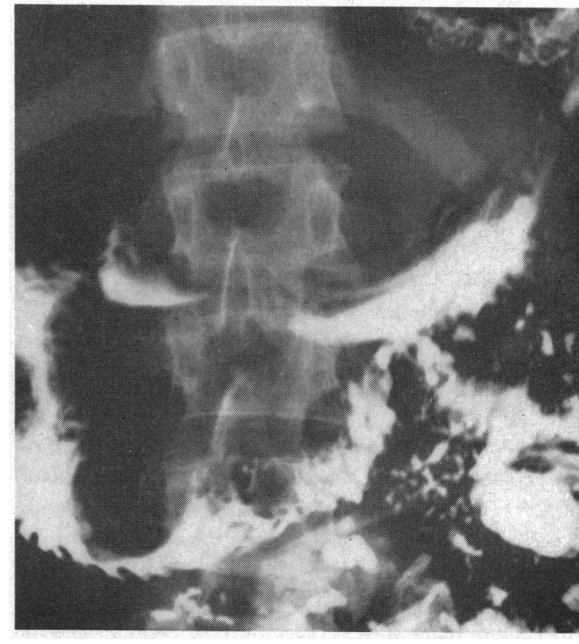

Figure 1.—Note two rounded indentations on the superior aspect of the second and third portions of the duodenum.

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Submitted 9 December 1965.